

ENGINEERING AND RELATED SERVICES

November 20, 2009

STATE PROJECT NO. 700-99-0507

RETAINER CONTRACT FOR GEOTECHNICAL SERVICES STATEWIDE

Under Authority granted by Title 48 of Louisiana Revised Statutes, the Louisiana Department of Transportation and Development (DOTD) hereby issues a Request for Qualification Statements (RFQ) on Standard Form 24-102 (SF 24-102), "Professional Engineering and Related Services", revised January 2003, from Consulting Firms (Consultant) to provide engineering and related services. **All requirements of Louisiana Professional Engineering and Land Surveying (LAPELS) Board must be met prior to the execution of the contract. As required by law, any firm drilling soil borings shall be licensed as a Water Well Contractor in accordance with the Water Well Rules, Regulations and Standards of the State of Louisiana.** Evidence of a current license will be provided with the Qualification Statements. One Consultant will be selected for this Contract. In the event that a Sub-Consultant or Sub-Contractor needs to be utilized for drilling/CPT services or field construction monitoring services, formal written notice shall be given to the DOTD of their qualifications two weeks prior to the execution of any Task Order. The Sub-Consultant or Sub-Contractor submitted for drilling services shall possess a Louisiana Water Well Contractor license and are subject to DOTD approval.

Project Manager – Mr. Benjamin Fernandez

All inquiries concerning this advertisement should be sent in writing to Edward.Wedge@LA.gov.

PROJECT DESCRIPTION

The selected Consultant/Team will perform geotechnical exploration and/or engineering related services for statewide projects covered by a Retainer Contract under separate Task Orders. The Consultant/Team shall be required to execute a Task Order (TO) for each designated project which will specify the scope of services, contract time, and compensation. Each TO will become part of the Retainer Contract.

SCOPE OF SERVICES

Geotechnical Exploration and Investigations

The Consultant shall send a progress report either by email or fax to the Project Manager every Friday when a Task Order is active detailing the progress to-date and their planned upcoming weekly activities related to any active Task Orders. Units of measure (English or Metric (SI)) for reporting results for each Task Order will be designated and will be

consistent throughout each Task Order. The geotechnical investigations, sampling and testing services to be provided shall include, but are not limited to:

- Field Reconnaissance (including rights of entry, utility locations, access, etc.)
- Mobilization/demobilization
- Deep and Shallow Soil borings
- CPT soundings (ASTM D5778)
- Water table elevations with duration of reading
- GPS Latitude and Longitude of borings to within 10 ft (3 m) accuracy
- Sealing boreholes in accordance to LA Water Well and DEQ Regulations
- Standard Penetration Tests and Split-Barrel Sampling of Soils (AASHTO T 206)
- Unconfined Compressive Strength of Cohesive Soils (AASHTO T 208)
- Specific Gravity of Soils (AASHTO T 100)
- Laboratory Determination of Moisture Content of Soils (AASHTO T 265)
- Triaxial Compression Tests, Unconsolidated, Undrained (AASHTO T 296)
- Triaxial Compression Tests, Consolidated Drained 3-point (AASHTO T 297)
- Atterberg Limits (DOTD TR 428)
- Consolidation Tests with Rebound (AASHTO T 216)
- Organic Content (DOTD TR 413)
- Classification of Soils
 - Deep borings (ASTM D 2487 (USCS method))
 - Shallow borings (ASTM D 3282(AASHTO method))
- Drafting of boring logs
- Drafting of subgrade soil surveys
- Traffic Control

The deep soil borings shall be made by the wet rotary drilling method. In each deep boring, undisturbed samples of cohesive or semi-cohesive material shall be obtained from each distinct soil stratum that is penetrated or 5 ft (1.5 m) interval, whichever is less, using a 3 in. (76 mm) diameter Shelby tube sampling barrel as per AASHTO D 207. When cohesionless soils are encountered at any depth, a split spoon sampler shall be used in conjunction with Standard Penetration Tests (SPT) at 3 foot (1 m) intervals. In the case of massive dense sands being encountered, the Project Manager may be contacted in order to relax the sampling interval, on a case-by-case basis. If requested by DOTD, continuous sampling of a boring will be obtained at 3 foot (1 m) intervals to a pre-determined depth. Boring samples shall be retained for a minimum period of 90 days.

Boring logs which show evidence of SPT's in cohesive soils or tube samples in cohesionless soils will not be accepted.

Transport of samples from the field to the laboratory shall conform to ASTM D4220, Group C. Samples may not be extruded at the worksite. Sample tubes shall be transported vertically in the same orientation as they were sampled, with care taken to avoid excessive temperature variation, vibration, or any other sample disturbance. They shall be extruded in the laboratory in accordance by means of a continuous pressure

hydraulic ram. Extrusion by any other method, such as water pressure, is prohibited. Samples shall be extruded directly onto a sample trough, and shall not be caught with the hands.

Soil mechanics laboratory testing shall be performed on at least 75 percent of all samples obtained from the borings. (UU Triaxial compression and Atterberg limit testing shall be performed on at least 75 percent of the extruded cohesive samples.)

If designated as required for the boring, consolidation tests shall be performed according to AASHTO T 216, and results shall be reported as graphs of "Void Ratio vs. Log of Pressure" and "Coefficient of Consolidation vs. Log of Pressure". Both plots may be shown on the same graph, if adequately labeled. Any sample from a clay layer that shows signs of being overconsolidated must be subjected to a load/rebound/re-load cycle during the consolidation testing, as per AASHTO T 216. Any sample selected for consolidation testing shall also have the specific gravity determined according to AASHTO T 100, and the Atterberg Limits determined according to DOTD TR 428, and with supporting results reported. Laboratory classification of soils from deep borings shall be in accordance with ASTM D 2487. All other sampling and testing shall be performed in accordance with current AASHTO test procedures, unless otherwise noted.

Shallow soil borings for subgrade soil surveys can be made utilizing either hollow-stem or continuous-flight augers. Any other method shall be approved by the DOTD Pavement & Geotechnical Services Administrator prior to it being implemented. Due to the unique nature of each subgrade project, sampling and testing requirements for each project requiring shallow borings will be specified in the Task Order before the notice to proceed.

The CPT rigs shall be capable of providing up to 20 tons reaction. Pore pressure measurements, when requested by the Project Manager, shall be obtained using U2 location, unless otherwise specified. Dissipation tests shall be performed until at least 50 percent of the excess pore water pressure has been dissipated. All CPT probes and equipment utilized shall have been calibrated within the previous year or within a period specified by the project manager. The cost of performing the calibration shall be the consultant's responsibility. The final CPT sounding results shall conform to the input format of LTRC's CPT-Pile software.

All or part of the services listed above may be required for each boring. The natural ground in elevation at the location of each borehole shall be determined to within 6 in. (0.15 m). These elevations may be determined utilizing elevations of existing structures for landmarks that may be shown on the plans supplied. If DOTD has established a temporary benchmark (TBM) at the site, it shall be used in lieu of elevations shown on the plans.

Unless otherwise stated in a Task Order, it will be the responsibility of the Consultant to obtain consent from the respective landowners in order to enter onto private property. The process for contacting landowners and documentation for Consultant Entry will be

discussed at the Consultant Kickoff meeting with DOTD personnel prior to task orders being issued. In the case that consent is not granted, the Consultant shall contact the project manager to execute a Forced Entry, as per Louisiana Revised Statute 48:217. Forced entry access will be granted via written notice from the project manager.

Deliverables

It will be the responsibility of the Consultant to obtain 3 or 4 mil polyester double matte film for use in reporting the geotechnical exploration results. The DOTD Pavement & Geotechnical Services Section will provide one sheet to the Consultant for use as an example of each format. The lettering used on the profiles shall be of such size and clarity that the legibility of data can be maintained when reduced to fifty (50) percent of its original size. Soil profiles shall be grouped on the plan sheets according to the Construction Project Number(s). In addition to the paper submittal, electronic logs that can be imported into the gINT software for the electronic storage of the soil boring and CPT logs shall be submitted. All project deliverables shall become the property of DOTD upon successful completion of the above captioned project.

All reported test results, including each profile sheet, shall be sealed and manually signed and dated by the Professional Engineer in responsible charge of testing. The DOTD Pavement and Geotechnical Services Section will review the completed boring logs for completeness and accuracy prior to their final submittal.

Geotechnical Engineering Analysis and Design

All geotechnical engineering will be performed in accordance with present design requirements and standard engineering practice. These services are to include but are not limited to:

- slope stability (embankment & excavation)
- embankment settlement
- bridge foundations
 - piles
 - drilled shafts
- other foundations
- pile supported approach slab design data
- bridge foundation static and dynamic load test program
- earth retaining structures
- culverts
- geotechnical analysis & design recommendations report
- geotechnical instrumentation

Please refer to **Attachment “A”** located at the end of this document for specific details for the above engineering services. Payment for these services will be at the rates established by the CCS shown in Table 1 later in this document.

Construction Monitoring and Problem Resolution

During test pile program or production pile driving, the selected consultant, when required, will perform dynamic pile testing. The dynamic pile testing includes supplying all equipment, strain gages, and accelerometers to collect data. The consultant will interpret the collected data for potential pile damages, providing pile driving assistance, and analyzed the data to determine the pile resistance.

The selected consultant, when required, will also monitor drilled shaft installations for trial and test shafts perform crosshole sonic logging tests and interpret shaft inspection device results.

The selected consultant will also perform sonic echo/impact response tests and interpret the results when requested.

REFERENCES

All services and documents will meet the standard requirements as to format and content of the DOTD; and will be prepared in accordance with the latest applicable editions, supplements and revisions of the following:

1. AASHTO Standards, ASTM Standards or DOTD Test Procedures
2. DOTD Location and Survey Manual
3. DOTD Roadway Design Procedures and Details
4. DOTD Hydraulics Manual
5. DOTD Standard Specifications for Roads and Bridges
6. Manual of Uniform Traffic Control Devices
7. DOTD Traffic Signal Design Manual
8. National Environmental Policy Act (NEPA)
9. National Electric Safety Code
10. National Electric Code (NFPA 70)
11. DOTD Environmental Impact Procedures (Vols. I-III)
12. Policy on Geometric Design of Highways and Streets
13. Construction Contract Administration Manual
14. Materials Sampling Manual
15. DOTD Bridge Design Manual
16. Consultant Contract Services Manual
17. Geotechnical Engineering Services Document
18. Bridge Inspectors Reference Manual
19. DOTD Stage 1 Manual of Standard Practice

COMPENSATION

Compensation to the Consultant for services rendered in connection with each TO shall be made based on unit/billable rates for the services rendered as listed in the "Statewide Geotechnical Rates" in Table 1 below from the Consultant Contract Services Unit of

DOTD. Any item not covered by this list will be negotiated. These rates will be reviewed after two years.

The total amount payable under this Retainer Contract for services to be performed under the various TO's shall not exceed a maximum of **\$ 5,000,000**. Each TO shall be payable under the respective TO project number which shall be obtained by the Project Manager.

Table 1: Statewide Geotechnical Rates

SERVICE		UN ITS	Suggested Rate
FIELD FUNCTIONS			
MOBILIZATION/DEMOBILIZATION, LAND DRILLING EQUIPMENT		mi	NEGOTIATED
MOBILIZATION/DEMOBILIZATION, SWAMP DRILLING EQUIPMENT		mi	
MOBILIZATION/DEMOBILIZATION, WATER DRILLING EQUIPMENT		mi	
MOBILIZATION/DEMOBILIZATION, GEOPROBE DRILLING EQUIPMENT		mi	
<u>DRILLING & SAMPLING, LAND, (AASHTO T-206 & T-207)</u>			
100ft or less		ft	\$15.00
101ft to 150ft		ft	\$21.00
151ft to 200ft		ft	\$26.00
Continuous Sampling to -40"		ft	\$20.00
<u>DRILLING & SAMPLING, SWAMP (AASHTO T-206 & T-207)</u>			
100ft or less		ft	\$18.00
101ft to 150ft		ft	\$24.00
151ft to 200ft		ft	\$29.00
<u>DRILLING & SAMPLING, WATER (AASHTO T-206 & T-207)</u>			
100ft or less		ft	\$24.00
101ft to 150ft		ft	\$32.00
151ft to 200ft		ft	\$38.00
<u>DRILLING & SAMPLING, GEOPROBE</u>			
20ft or less, 4' acetate liners		ft	\$11.00
21ft to 30ft, 4' acetate liners		ft	\$15.00
<u>DRILLING & SAMPLING, ECPT</u>			
100ft or less, including grouting		ft	\$11.00
AUGER DRILLING (AASHTO T203)		ft	\$11.00
DIFFICULT BORING ACCESS		hr	\$185.00
DIFFICULT ECPT ACCESS		hr	\$195.00
SETTING CASING		ft	\$9.00
SETTING ECPT CASING		ft	\$6.00
SEALING BOREHOLES, 4"		ft	\$5.00
SEALING BOREHOLES, 6"		ft	\$7.00

CORING OF PORTLAND CEMENT CONCRETE FOR BORINGS, 4"	in	\$12.00
CORING OF PORTLAND CEMENT CONCRETE FOR BORINGS, 6"	in	\$16.00
CORING OF PORTLAND CEMENT CONCRETE FOR BORINGS, 3"	in	\$9.00
MILEAGE	mi	set by PPM 49
DIFFERENTIAL GLOBAL POSITIONING	bore	\$25.00
LABORATORY FUNCTIONS		
UNCONFINED COMPRESSIVE STRENGTH TESTS AND UNIT WEIGHT (AASHTO T208)	ea.	\$41.00
UNIT WEIGHT OF UNDISTURBED SAMPLES	ea.	\$19.00
ATTERBERG LIMITS (DOTD TR 428)	ea.	\$49.00
TRIAXIAL COMPRESSION, UNCONSOLIDATED UNDRAINED (AASHTO T296)	ea.	\$60.00
TRIAXIAL COMPRESSION, CONSOLIDATED DRAINED 3 PT. (AASHTO T297)	ea.	\$450.00
CONSOLIDATION TESTS WITH REBOUND (AASHTO T216)	ea.	\$390.00
SIEVE ANALYSIS (DOTD TR 112 & TR 113)	ea.	\$50.00
PARTICLE SIZE ANALYSIS (MECHANICAL)	ea.	\$79.00
MOISTURE CONTENT (DOTD TR 403 or AASHTO T265)	ea.	\$10.00
ORGANIC CONTENT (TR 413)	ea.	\$50.00
pH DETERMINATION	ea.	\$25.00
PASSING 200 SIEVE (WET)	ea.	\$35.00
DRY PREPARATION OF SUBGRADE SOIL SAMPLES	ea.	\$35.00
SHELBY TUBE SAMPLE EXTRACTION	ea.	\$15.00
RESISTIVITY	ea.	\$150.00
CRUMB TEST	ea.	omit
TOTAL DISSOLVED SALTS	ea.	omit
DISPERSIVE CHARACTERISTICS OF CLAY SOILS BY DOUBLE HYDROMETER	ea.	omit
LABOR CLASSIFICATIONS, OFFICE		
PRINCIPAL	hr.	\$190.00
SUPERVISOR, ENGINEER	hr.	\$158.00
SUPERVISOR, OTHER	hr.	\$128.00
ENGINEER	hr.	\$112.00
PRE-PROFESSIONAL	hr.	\$85.00
SENIOR TECHNICIAN	hr.	\$75.00
CAD TECHNICIAN	hr.	\$65.00
TECHNICIAN	hr.	\$60.00

CAD DRAFTER		hr.	\$53.00
CLERICAL		hr.	\$47.00
LABOR CLASSIFICATIONS, FIELD			
PRINCIPAL		hr.	\$169.00
SUPERVISOR, ENGINEER		hr.	\$138.00
SUPERVISOR, OTHER		hr.	\$119.00
ENGINEER		hr.	\$101.00
PRE-PROFESSIONAL		hr.	\$82.00
SENIOR TECHNICIAN		hr.	\$72.00
CAD TECHNICIAN		hr.	\$52.00
TECHNICIAN		hr.	\$46.00
CAD DRAFTER		hr.	\$50.00
CLERICAL		hr.	\$41.00
PDA Rental		day	\$400.00
PIT Rental		day	\$250.00
CSL Rental		day	\$350.00
PDA operator (specialist) to be paid with labor classification above			

Difficult Boring access charges apply for off-road borehole locations that require transporting equipment and supplies between location by the use of matting or bulldozer in excess of one hour. Hourly rates include billing rates for drill rig, service vehicles, and drill crew. Drill rig set up and dismantling is included in the drilling costs per linear foot (meter) and is not to be included in boring access charges.

Unless specifically requested in the Task Order, payment for sieve analysis will be included in the cost for classification.

Payment for natural water content as determined by DOTD TR 403 will be restricted to samples having a reported plasticity index (PI) greater than 5, as determined by DOTD TR 428.

Payment for unit weight of undisturbed samples will be included in the cost for unconfined compressive strength unless compressive strength is unable to be determined due to sample condition.

Invoicing for Task Orders of durations less than or equal to 45 days should be on one invoice. Task Orders of durations greater than 45 days should be separated into field exploration and lab testing invoices. The lab testing invoice will be reviewed after receipt of the boring log/subgrade soil survey. DOTD requests that the items on the invoice should be in the same order as Table 1 to expedite payment. Direct costs, such as equipment rental or surveying charges, should be included on the invoice as separate items with receipts and not subject to the 5% retainage.

CONTRACT TIME AND NOTICE TO PROCEED

This Retainer Contract shall be in effect for the duration of **five years**. The services to be performed for each Task Order (TO) will be determined prior to the execution of the TO. The Consultant will proceed with the services required in the TO upon issuance of the Notice to Proceed from the DOTD. The contract time for each TO, will be specified in the executed TO. Any TO in effect, prior to the expiration date of the Retainer Contract shall be completed.

QUALITY CONTROL/QUALITY ASSURANCE

The DOTD requires the Consultant to develop a Quality Control/Quality Assurance program; in order to provide a mechanism by which all contracted services can be subject to a systematic and consistent review. Consultants must ensure quality and adhere to established design policies, procedures, standards, and guidelines in the preparation and review of all design products. The DOTD shall provide limited input and technical assistance to the Consultant.

MINIMUM PERSONNEL REQUIREMENTS

The following requirements must be met at the time of submittal:

1. At least one Principal of the Prime-Consultant must be a Professional Engineer registered in the State of Louisiana.
2. In addition to the above, the Prime-Consultant must employ on a full-time basis a minimum of two Professional Engineers with a minimum of five years experience in geotechnical engineering with corresponding support staffs.
3. The Prime-Consultant must also employ on a full-time basis, or through the use of a Sub-Consultant(s):
 - a. A minimum of two certified PDA testers (High Strain Dynamic Pile Testing by Foundation QA). One of the certified testers shall have a certification above the Master level (Expert and Master). The other shall have a certification level above Basic (Basic, Intermediate, Advanced, Master, or Expert).
 - b. A minimum of one engineer having at least five years of experience in performing and interpretation of non destructive testing of deep foundations (Crosshole Sonic Logging and Sonic Echo/Impact Response testing).

EVALUATION CRITERIA

The general criteria to be used by DOTD (when applicable) in evaluating responses for the selection of a Consultant to perform these services are:

1. Consultant's firm experience on similar projects, weighting factor of 3;

2. Consultant's personnel experience on similar projects, weighting factor of 4;
3. Consultant's firm size as related to the estimated project cost, weighting factor of 3;
4. Consultant's past performance on similar DOTD projects, weighting factor of 6;**
5. Consultant's current work load, weighting factor of 5;
6. Location where the work will be performed, weighting factor of 4.

*All respondents will receive a 4 for this category.

**The Geotechnical Exploration (GE) performance rating will be used for this project.

Complexity level is **moderate**.

Consultants will be evaluated as indicated in Items 1- 6. The evaluation will be by means of a point-based rating system. Each of the above criteria will receive a rating on a scale of 0-4. Then the rating will be multiplied by the corresponding weighting factor. The firm's ratings in each category will then be added to arrive at the Consultant's final rating.

If Sub-Consultants are used, each member of the Consultant/Team will be evaluated on their part of the contract, proportional to the amount of their work. The individual team member ratings will then be added to arrive at the Consultant/Team rating.

Communication Protocol

DOTD's Project Evaluation Team will be responsible for performing the above described evaluation, and will present a short-list of the three (if three are qualified) highest rated Consultants to the Secretary of the DOTD. The Secretary will make the final selection.

1. Edward R. Wedge – Ex officio
2. Benjamin Fernandez – Project Manager
3. Ching Tsai
4. Kim Garlington
5. Kelly Kemp
6. Ray Mumphrey

Rules of Contact (Title 48 Engineering and Related Services)

These rules are designed to promote a fair, unbiased, legally defensible selection process. The LA DOTD is the single source of information regarding the Contract selection. The following rules of contact will apply during the Contract selection process and will commence on the date of advertisement and cease at the notice of selection as shown on the DOTD website. Contact includes face-to-face, telephone, facsimile, Electronic-mail (E-mail), or formal written communications. Any contact determined to be improper, at the sole discretion of the LA DOTD, may result in the rejection of the submittal (SF 24-102):

- A. The Consultant shall correspond with the LA DOTD regarding this advertisement only through the LA DOTD Consultant Contracts Services Administrator;

- B. The Consultant, nor any other party on behalf of the Consultant, shall not contact any LA DOTD employees, including but not limited to, department heads; members of the evaluation teams; and any official who may participate in the decision to award the contract resulting from this advertisement except through the process identified above. Contact between Consultant organizations and LA DOTD employees is allowed during LA DOTD sponsored one-on-one meetings;
- C. Any communication determined to be improper, at the sole discretion of the LA DOTD, may result in the rejection of submittal, at the sole discretion of the LA DOTD;
- D. Any official information regarding the project will be disseminated from the LA DOTD'S designated representative on the LA DOTD website. Any official correspondence will be in writing;
- E. The LA DOTD will not be responsible for any verbal exchange or any other information or exchange that occurs outside the official process specified herein.

By submission of a response to this RFQ, the Consultant agrees to the communication protocol herein.

CONTRACT REQUIREMENTS

The selected Consultant will be required to execute the contract within 10 days after receipt of the contract.

INSURANCE - During the term of this contract, the Consultant will carry professional liability insurance in the amount of \$1,000,000. This insurance will be written on a "claims-made" basis. Prior to executing the contract, the Consultant will provide a Certificate of Insurance to DOTD showing evidence of such professional liability insurance.

AUDIT - The selected Consultant will allow the DOTD Audit Section to perform an annual overhead audit of their books, or provide an *independent* Certified Public Accountant (CPA) audited overhead rate. This rate must be developed using Federal Acquisition Regulations (FAR) and guidelines provided by the DOTD Audit Section. In addition, the Consultant will submit semi-annual labor rate information, when requested by DOTD.

The selected Consultant will maintain, an approved Project Cost System and segregate direct from indirect cost in their General Ledger. Pre-award and post audits, as well as interim audits, may be required. For audit purposes, the selected Consultant will maintain accounting records for a minimum of five years after final contract payment.

Any Consultant currently under contract with the DOTD and who has not met all the audit requirements documented in the manual and/or notices posted on the DOTD Consultant Contract Services Website (www.dotd.louisiana.gov), will not be considered for this project.

SUBMITTAL REQUIREMENTS

One original (**stamped original**) and **five** copies of the SF 24-102 must be submitted to DOTD. All submittals must be in accordance with the requirements of this advertisement and the Consultant Contract Services Manual. Any Consultant/Team failing to submit any of the information required on the SF 24-102, or providing inaccurate information on the SF 24-102, will be considered non-responsive.

Any Sub-Consultants to be used, including Disadvantaged Business Enterprises (DBE), in performance of this Contract, must also submit a SF 24-102, which is completely filled out and contains all information pertinent to the work to be performed.

The Sub-Consultant's SF 24-102 must be firmly bound to the Consultant's SF 24-102. In Section 9, the Consultant's SF 24-102 must describe the **work elements** to be performed by the Sub-Consultant(s), and state the approximate **percentage** of each work element to be subcontracted to each Sub-Consultant.

Name(s) of the Consultant/Team listed on the SF 24-102, must precisely match the name(s) filed with the Louisiana Secretary of State, Corporation Division, and the Louisiana State Board of Registration for Professional Engineers and Land Surveyors.

The SF 24-102 will be identified with State Project No. **700-99-0507**, and will be submitted **prior to 3:00 p.m. CST on Monday, December 7, 2009** by hand delivery or mail, addressed to:

Department of Transportation and Development
Attn.: Mr. Edward R. Wedge, P.E.
Contracts Administrator
1201 Capitol Access Road, **Room 405-T**
Baton Rouge, LA 70802-4438 or
Post Office Box 94245
Baton Rouge, Louisiana 70804-9245
Telephone: (225) 379-1989

REVISIONS TO THE RFQ

DOTD reserves the right to revise any part of the RFQ by issuing an addendum to the RFQ at any time. Issuance of this RFQ in no way constitutes a commitment by DOTD to award a contract. DOTD reserves the right to accept or reject, in whole or part, all Qualification Statements submitted and/or cancel this announcement if it is determined to be in DOTD's best interest. All materials submitted in response to this announcement become the property of DOTD and selection or rejection of a submittal does not affect this right. DOTD also reserves the right, at its sole discretion, to waive administrative informalities contained in the RFQ.

ATTACHMENT “A” Geotechnical Services Document

This attachment details the minimum requirements and expectations for performing geotechnical engineering services for DOTD. This attachment is intended to be an overview of expectations and may not be ‘all-inclusive’.

SLOPE STABILITY (Embankment & Excavation):

The Objective of a Slope Stability Analysis is to determine the factor of safety of the proposed embankment or excavation on the project subsurface soils and make appropriate Engineering Design Recommendations. A maximum resistance factor of 0.75 is considered adequate for embankment side and end slopes. For cut sections, a maximum resistance factor of 0.65 is desirable. For short term draw-down conditions, a maximum resistance factor of 0.85 is considered adequate.

Standard Procedure: The embankment/excavation slope stability analysis shall consist of (1) modeling the appropriate boring logs to define the critical embankment/excavation geometry (cross-section) with subsurface soils, (2) interpreting the shear strength test data to determine drained and/or un-drained shear strength design parameters, (3) performing the stability analysis utilizing the Bishop, Spencer, and/or sliding block method deemed appropriate by the engineer. PCSTABL4 or newer version is recommended, (4) determining the maximum resistance factors for both long and short-term conditions at the critical fill heights at each bridge end, along the approach embankment (intermediate fill height) and in critical cut sections. Maximum resistance factor should also be taken into consideration for rapid drawdown conditions when applicable, (5) analyzing different methods for mitigating possible stability problems and if necessary, make recommendations for geotechnical instrumentation to monitor stability performance, (6) defining areas of highly erodible materials and analyzing erosion control measures, (7) preparing a report with all the above information and engineering recommendations, and (8) during construction, the consultant will interpret slope stability data from all geotechnical instrumentation monitoring devices and make appropriate recommendations.

Deliverables of Slope Stability Analysis shall include the following:

- Printout of critical stability circle and/or block for each design case.
- Geotechnical models (cross-sections) and design input parameters.
- Summary table with critical fill heights and resistance factors, or critical excavation cross-sections with resistance factors.
- Certification that the modeled embankments meet the required long and short-term resistance factors required.
- Summary of alternatives for mitigating possible stability problems with resistance factors and estimated costs.
- Specifications for slope stability mitigation measures.
- Geotechnical Instrumentation Plan (if recommended).
- Recommended erosion control measures.
- Construction Slope Stability notes for the Bridge General Notes Sheet.

- Graphical presentation of lateral movements obtained from Geotechnical Instrumentation data during construction monitoring.

EMBANKMENT SETTLEMENT:

The Objective of a Consolidation/Settlement Analysis is to determine the amount of settlement in inches/feet, and the time required for this settlement to take place in days/months/years when the proposed embankment is constructed on the project subsurface soils, and make appropriate Engineering Design Recommendations.

Standard Procedure: The embankment settlement analysis shall consist of (1) modeling the appropriate boring logs to define the critical embankment geometry (cross-section) with subsurface soils, (2) interpreting the consolidation test data to determine design consolidation soil parameters, (3) performing a settlement analysis for the critical bridge end fill heights and for intermediate fill heights as needed, (4) determining the predicted total consolidation settlement, the predicted 90% consolidation settlement and the time periods for the predicted settlement to occur, (5) if the predicted time for 90% of the settlement to occur is excessive (greater than 5 months) recommendations shall be made to reduce the amount of consolidation settlement and/or to accelerate the settlement through the use of lightweight fills, surcharge placement, wick drains or other methods determined by the Engineer, (6) if mitigation is required, the consultant shall include all analyses and information including special provisions relating to surcharge quantities and limits, wick drain information and layouts and settlement monitoring instrumentation details, (7) assess the impact of predicted settlement and recommended mitigation on pavement, culverts, retaining walls and bridge abutments, (8) preparing a report with all the above information and engineering recommendations, and (9) during construction, the consultant will interpret settlement data from all monitoring geotechnical instrumentation devices and make recommendations for surcharge removal or other geotechnical related construction activity.

Deliverables of Consolidation/Settlement Analysis shall include the following:

- Geotechnical models (cross-sections) with design input parameters.
- Printout of settlement analysis for each design case.
- Presentation of settlement analysis in graphical form (Settlement vs. Time of consolidation Curves) with clear indications of total predicted settlement, 90% predicted settlement, and the effect of surcharging and/or placing wick drains. Hand calculations should be included.
- Assessment of the potential impact of predicted settlement and any recommended mitigation on pavement, culverts, retaining walls and bridge abutments.
- Wick Drain Design Sheets
- Specifications for recommended settlement mitigation measures (surcharge, wick drains, etc.)
- Geotechnical Instrumentation Plan with Drawings and Specifications (if recommended)
- Graphical output of actual field settlement data obtained from Geotechnical Instrumentation during construction monitoring.

- Construction Settlement notes for the Bridge General Notes Sheet.

BRIDGE FOUNDATIONS:

PILES:

The Objective of a Pile Design Analysis is to determine the pile type, pile capacity, lateral load requirements, and pile length for the project subsurface soils considering pile set-up, down-drag (negative skin friction), potential scour, and other project related factors.

Standard Procedure: The Pile Foundation Design Scope of work shall consist of (1) modeling the appropriate deep boring logs and/or Cone Penetration (CPT) sounding data to define the project subsurface soil profile, (2) obtaining Standard Penetration Test (SPT) N-values and interpreting the laboratory test data to determine pile design soil parameters, (3) performing pile static analyses to determine pile type, pile capacity and plan pile tip elevation or length, (4) estimating foundation settlement and “down-drag” loads, (5) performing lateral load analyses, (6) estimating scour depths, (7) performing wave equation analyses to determine pile drivability and hammer approval, (8) assessing constructability issues such as installation sequencing, heave and/or lateral pile movement, installation aids (jetting or augering), etc., (9) performing analyses to develop test pile recommendations (feasibility, location, test pile tip elevation, etc.), and pile driving analyzer (PDA) recommendations.

(The consultant shall utilize approved pile capacity prediction methods or software. The “PILECPT” software provided by the LTRC Web site shall be utilized with the CPT sounding data.)

Deliverables for Pile Foundation Design Analysis shall include the following:

- Design spreadsheets or calculations indicating the geotechnical design parameters utilized for each boring log, including scour elevations if applicable, for the pile type selected.
- Graphical or tabulated representation of the pile capacity vs. tip elevation (not depth of penetration).
- If the FHWA software Driven 1.2 is used, include an electronic copy of the data file generated along with a hard copy of the input and output.
- Lateral load analyses.
- Recommended plan pile tip elevations for all bents. (Shown in the pile data sheet.)
- Feasibility study for utilizing a test pile (static resistance factors vs. dynamic resistance factors).
- Drivability recommendations.
- Pile installation criteria with discussion of installation issues.
- Pile Driving Analyzer (PDA) recommendations.
- Hammer approval method recommendations.
- Necessary pay items and corresponding quantities for test piles, indicator piles, and monitor piles.

- Special Provisions for Dynamic Monitoring and Dynamic Analysis, if recommended for project.
- Special Provision for Static Load Test, if recommended for project.
- Considerations for “down-drag” effects on piles.
- Considerations for pile “set-up”.
- Uplift Capacity of Group Piles if required by project conditions.
- Pile notes for the Bridge General Notes Sheet.

DRILLED SHAFTS:

The Objective of a Drilled Shaft Analysis Design is to determine the diameter, tip elevation and installation procedure for the project subsurface soil conditions.

Standard Procedure: The Drilled Shaft Foundation Design Scope of work shall consist of (1) modeling the appropriate deep boring logs and/or Cone Penetration (CPT) sounding data to define the project subsurface soil profile, (2) obtaining Standard Penetration Test (SPT) N-values and interpreting the laboratory test data to determine drilled shaft design soil parameters, (3) selecting appropriate design equations for the project soil types to determine ultimate base and side resistance and selecting appropriate resistance factor, (4) performing axial and lateral load analyses to determine drilled shaft diameter and tip elevation, and (5) performing analyses to determine appropriate Construction Method for project soil conditions.

Deliverables for Drilled Shaft Foundation Analysis and Design shall include the following:

- Design spreadsheets or calculations indicating the geotechnical design parameters utilized for each boring log including scour elevations if applicable.
- Graphical or tabulated representation of the drilled shaft capacity vs. tip elevation for each diameter.
- Lateral load analyses.
- Considerations for “down-drag”.
- Recommended plan drilled shaft diameters and tip elevations for all bents. (Shown in the Drilled Shaft data sheet.)
- Recommended Construction Method with discussion of installation issues.
- Recommendations for Construction Quality Control.
- Drilled Shaft notes for the Bridge General Notes Sheet.
- Special Provision for Integrity Testing if required for project.
- Special Provision for drilled shaft Load Test if required for project.

OTHER FOUNDATIONS:

If other types of foundation are recommended for the specific project conditions, the Standard Procedure format and the Deliverables format outlined for piles and drilled shafts shall be followed with specific design details for the type of Foundation recommended.

PILE SUPPORTED APPROACH SLAB DESIGN DATA:

The DOTD normally uses a timber pile supported approach slab to minimize differential settlement in the transition zone between the approach embankment and the bridge abutment.

Deliverables for Pile Supported Approach Slabs shall include the following:

- Layout showing pile locations.
- Pile diameter and length.
- Drivability Recommendations

BRIDGE FOUNDATION LOAD TEST PROGRAM:

If the project subsurface conditions are difficult and if significant uncertainties exist in the Foundation Design and if cost savings can be predicted, a Foundation Load Test Program may be appropriate. Depending on project conditions, a Foundation Load Test Program may be included either in the Design or in the Construction phase.

Deliverables for the Foundation Load Test Program shall include the following:

- Location and Type of Load Test Proposed.
- Design of Test Foundation (pile, drilled shaft, or other).
- Dynamic Test Procedures and Schedules
- Load Increment Requirements.
- Maximum Test Load.
- Instrumentation Requirements.
- Load Test Layout and Design Sheets for Plans.
- Special Provision for Construction of Test Foundation and Conduct of Load Test.
- Interpretation of Load Test Results and Recommendations.
- Foundation Load Test Report.

EARTH RETAINING STRUCTURES:

General Considerations:

A Retaining Wall is normally required if adequate space (r-o-w) is not available for a Slope. The DOTD has used Mechanically Stabilized Earth (MSE) Walls, Gravity Concrete Walls, Sheet Pile Walls, plus other types for transportation projects. The selection of the most appropriate Retaining Wall type for the specific project requirements and site and subsurface conditions can have profound effects on the project cost and constructability.

Every Retaining Wall type has a unique design procedure and generally requires the services and coordination of a Geotechnical Engineer and a Structural Engineer. The following criteria are generally required for analysis and design of all Retaining Wall types:

Deliverables for all Retaining Wall Analyses and Designs shall as a minimum include the following:

- Earth Pressure Distributions.
- Bearing Capacity of the foundation soil or rock.
- Analyses for Sliding and Overturning and Mitigation Recommendations.
- Settlement and Tilt (Rotation) Analyses and Mitigation Recommendations.
- Drainage Recommendations
- Global Stability Analyses and Mitigation Recommendations.
- Backfill Properties.
- Wall Components/Materials.
- Wall Construction Procedures.
- Wall Layout with plan view, elevation view, typical sections and details.
- Quantities Table with applicable General Notes.
- Design Life.
- Special Provisions.

MECHANICALLY STABILIZED EARTH (MSE) WALLS:

The AASHTO LRFD Bridge Specifications, latest edition as well as all supplements shall be followed for analysis and design of all MSE Walls. The DOTD developed “MSEW Design Guide, G.E.D.G. No.8” dated Oct.1, 1999 may be used as a reference.

Additional **Deliverables for MSE Walls** shall be as outlined in the DOTD MSEW Design Guide and as required to identify the MSE specific design and construction requirements:

- Type and Size of Facing Element.
- Type, Size and Design Length of Reinforcement Elements.
- Type of Connections.
- Minimum embedment requirements.
- Backfill Material Requirements.
- If TEMPORARY WALL, identify specific requirements.

CONCRETE WALLS:

Cast-In-Place Concrete Gravity or Cantilever Walls are now generally limited to small applications or specialized situations because of the development of more economical wall types. Standard design and construction procedures are well documented in many geotechnical books and other publications.

Deliverables for Concrete Walls are as outlined under General Considerations above.

SHEET PILE WALLS:

The resistance factors from the AASHTO Bridge Design Specifications, latest edition, shall be used to design sheet pile walls. The DOTD’s “Preliminary” Design Guide titled

“DOTD CANTILEVER SHEET PILE DESIGN GUIDELINES” dated 10/26/00 may be used as a reference.

Additional **Deliverables for Sheet Pile Walls** shall be as outlined in the DOTD Guidelines:

- Sheet Pile Section and Type.
- Minimum Section Modulus.
- Minimum Depth of Penetration.
- Moment of Inertia Requirements.
- Estimated long and short term Deflections.
- Anchor Loads.
- Long and short term Stability including Drawdown and Liquefaction.
- Complete Design Details of sheet piling, Backfill, Drainage, and Connections.
- Corrosion Protection Measures.
- Construction Constraints

OTHER RETAINING WALL TYPES:

Other types of Retaining Walls that may be appropriate for DOTD transportation projects are Drilled Shaft Walls, Soldier Pile & Lagging Walls, Slurry Walls, Anchored (Tied-back) Walls, Soil Nailed Walls, Reticulated Micro-Pile Walls, Jet-Grouted Walls, and Deep Soil Mixing Walls. These walls shall be designed using generally recognized design procedures applicable to the specific type of wall used.

Note that **Reinforced Soil Slopes** may in some cases be an economical alternative to a Retaining Wall.

CULVERTS:

The geotechnical design review of the culvert locations shown in the plans shall consist of earth pressure calculations, bearing capacity analyses, settlement analyses and a constructability review of the culvert. Recommendations for bedding material, foundation supported options, insitu bearing improvements and construction procedures should be addressed.

Deliverables for Culverts shall include the following:

- Earth Pressure calculations and Recommendations.
- Bearing Capacity calculations and Recommendations.
- Settlement and Differential Settlement Estimates with design parameters.
- Recommendations for bedding material and/or other foundation support options.
- Any Specialized Construction Procedures and Recommendations.

GEOTECHNICAL ANALYSIS & DESIGN RECOMMENDATIONS REPORT:

No standard report format is required and the Consulting Firm may use its own format. However, the GEOTECHNICAL ANALYSIS & DESIGN RECOMMENDATIONS REPORT shall contain a Background Description of THE PROJECT such as location,

geological irregularity, if exists, engineering features and requirements, etc. and shall include all the items listed under Deliverables above that are a part of THE PROJECT.

CONSTRUCTION MONITORING:

BRIDGE FOUNDATIONS:

PILES:

The Pile foundation construction scope of work shall consist of providing the following Geotechnical services during the construction phase of the project:

- Hammer approval utilizing the Wave Equation Analyses (if alternate hammer approval method is not specified).
- Field monitoring the installation of test piles, monitor piles, indicator piles and/or production piles with the Pile Driving Analyzer (PDA).
- Analysis of PDA data utilizing CAPWAP AND GRLWEAP.
- Generating bearing capacity graphs (Inspector's Charts).
- Recommending pile driving criteria.
- Recommending final pile tip elevations based on the results of Load Tests or Dynamic Analyses.

The **Deliverables for Construction Monitoring of Piles** shall include the following:

- Hammer approval documentation.
- PDA Testing and Analysis Report with (1) PDA plots of pile capacity, driving stresses and energy transfer, (2) CAPWAP Pile Capacity Summary Table, and (3) Inspector's Charts.
- Final Pile Tip Elevations and Order Length Recommendations to the Structural Fabrication Engineer.

DRILLED SHAFTS:

The Drilled Shaft foundation construction scope of work shall include the construction monitoring items outlined in the DOTD Guide titled "Drilled Shaft Foundation Construction Inspectors Manual" dated 1/08/02 plus any special considerations specified in the Plan Notes.

The **Deliverables for Construction Monitoring of Drilled Shafts** shall include those required in the Guide Manual and the following:

- Comments/Recommendations on Contractor's "Drilled Shaft Installation Plan".
- Drilled Shaft Soil/Rock Excavation Logs.
- Drilled Shaft Concrete Placement Log.
- Theoretical Concrete Volume vs. Actual Concrete Volume Graph.
- Interpreted Shaft Diameter vs. Depths (Elevations).
- Excavation Rate and Concrete Placement Rate vs. Depths (Elevations)

- Inspection Report with (1) description of drilling method, clean-out methods, bottom inspection methods and findings and concrete placement and effectiveness, (2) If slurry-displacement method is used, Record of slurry properties, (3) description of difficulties encountered.
- Integrity Testing (Cross-hole Sonic Logging or other) Interpretation and Recommendations.

Other Foundations:

The scope of work for Other Foundations and the Deliverables shall be as recommended in the Geotechnical Analysis & Design Recommendations Report.

GEOTECHNICAL INSTRUMENTATION:

The Objective of Geotechnical Instrumentation in construction monitoring is to record and interpret the Instrumentation data and compare actual soil behavior to that predicted by Design. Each type of Instrumentation has an intended purpose and allows major decisions to be made by Construction Managers that affect construction safety (prevent major failures), scheduling, and construction costs. No instrumentation shall alter the performance of the geotechnical design. The usual Instrumentation specified to monitor foundation performance on projects where stability and settlement are critical are (1) Slope Inclinometers, Piezometers, and Settlement Devices. The “Geotechnical Analysis & Design Recommendations Report” should have an Instrumentation Layout plus recommended Frequency of Readings.

The Deliverables for Geotechnical Instrumentation shall include the following:

- Plan and elevation Location, Details, and applicable Notes for all Instrumentation.
- Specifications for Furnishing, Installation, Monitoring, and Reporting for all Instrumentation.
- Graphical presentation of lateral movement data and Action Recommendations.
- Graphical presentation of actual field settlement data and Action Recommendations.
- Interpretation of other Instrumentation data as recommended in the “Geotechnical Analysis & Design Recommendations Report” and Action Recommendations.

OTHER GEOTECHNICAL FEATURES:

Construction Monitoring and Construction Inspection of other geotechnical features such as Embankments and Excavation Earthwork, Drilled Shafts, Earth Retaining Structures, Soil Stabilization, etc. in the project shall be as required by the DOTD Standard Specifications. If special Construction Inspection and/or Monitoring is required for special Geotechnical features, they will be as recommended in the “Geotechnical Analysis & Design Recommendations Report”, Construction “Plan Notes” and “Special Provisions”.

LIST OF PUBLISHED GEOTECHNICAL DOTD REPORTS AND FORMS PLUS OTHER TECHNICAL REFERENCES

Most of the following can be obtained at the DOTD web site (www.dotd.state.la.us) or at the FHWA Bridge/Geotechnical web site (www.fhwa.dot.gov/bridge).

DOTD Reports and Forms:

- AASHTO LRFD Bridge Design Specifications, latest edition and supplements
- Standard Specification, latest edition
- Bridge Manual
- Road Design Manual
- Hydraulics Manual
- Materials Sampling Manual
- Materials Testing Procedures Manual
- Drilled Shaft Foundation Construction Inspection Manual (1/08/02)
- “Preliminary” DOTD Sheet Pile Design Guidelines (10/26/00)
- MSEW Design Guide, Geotechnical Engineering Design Guide (G.E.D.G.) No. 8 (10/01/1999)
- LTRC “PILECPT” Software
- Pile and Driving Equipment Data Form (06/19/06)
- Deep Soil Boring Request and Field & Laboratory Request Form (1/03/02) (in one sheet)
- Wick Drain Design Sheets
- DOTD Testing Procedures Guidelines For Standard Format

Other Technical References:

The DOTD has used the following as technical references and guidelines in the design and construction monitoring of Geotechnical features for DOTD projects in the past and are recommended for use by the Geotechnical Engineering Consultant community. This list is not all encompassing and other publications may be used and referenced. Additions will be made as this Document is updated.

- Subsurface Investigations Manual, Publication No. FHWA HI-97-021, Nov. 1997
- Manual On Subsurface Investigations, Published by AASHTO, 1988
- AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing, PART I – SPECIFICATIONS and PART II – TESTS, current edition
- ASTM Procedures and Regulations, current edition
- Earth Retaining Structures, Reference Manual (Draft), FHWA-NHI, May 1998
- Earth Retaining Systems, Geotechnical Engineering Circular No. 2, Publication No. FHWA-SA-96-038, February 1997
- MSE Walls and Reinforced Soil Slopes (update of DP 82 Manual), Publications No. FHWA NHI-00-043, and FHWA-NHI-00-044, March 2001
- Geotechnical Instrumentation Manual, Publication No. FHWA HI-98-034, October 1998

- Drilled Shafts: Construction Procedures and Design Methods Manual, Publication No. FHWA-IF-99-025, August 1999
- Soils and Foundations Workshop Manual, Publication No. FHWA NHI-00-045, August 2000
- Geosynthetic Design and Construction Guidelines Manual, Publication No. FHWA HI-95-038, April 1998
- Ground Improvement Technical Summaries, DP 116, Publication No. FHWA-SA-98-086
- Design and Construction of Driven Pile Foundations, Volumes 1 & 2, Publications No. FHWA-HI-97-013 and FHWA-HI-97-014, December 1996
- Soil Slope and Embankment Design, Reference Manual, FHWA-NHI, 2003
- Manual for Design & Construction Monitoring of Soil Nail Walls, Publication No. FHWA-SA-96-069, November 1996
- Soil Nailing Field Inspectors Manual, (DP 103), Publication No. FHWA-SA-93-068, April 1994
- NAVFAC Design Manuals, DM 7.1, DM 7.2 and DM7.3, May 1982